

Application Serial No.: 10/621,478
Applicants: James Gary Pruett, et al.
Reply to Office Action Dated: July 20, 2006

II. **REMARKS**

United States Serial No. 10/621,478 was filed on July 17, 2003. In response to the Examiner's Restriction Requirement, Applicants elected claims 42-52 for prosecution in the present application. Claims 1-41 have been withdrawn from consideration. In view of the remarks set forth herein, Applicants respectfully request reconsideration and allowance of claims 42-52.

35 U.S.C. §103 Rejection

The only rejection remaining in the prosecution is the rejection of claims 42-52 under 35 U.S.C. §103(a), in view of the combination of U.S. Patent No. 6,155,432 with U.S. Patent No. 6,264,045. Applicants respectfully traverse this rejection.

To establish a *prima facie* case of obviousness under §103 there must be (1) a suggestion or motivation to modify a reference, (2) a reasonable expectation of success, and (3) the modification of the reference must teach or suggest all claimed limitations. *In re Vaeck*, 947 F.2d 488 (Fed.Cir. 1991). Applicants respectfully submit that the reasons of record in the Office Action fail to establish all elements of a *prima facie* case of obviousness under §103.

U.S. Patent Nos. 6,155,432 and 6,264,045 both disclose carbon-carbon filter media. U.S. Patent No. 6,155,432 discloses that the carbon-carbon filter media may be constructed in the form of papers, felts, needled felts, fabrics, flat, shaped or corrugated plates, tubes, open cylinders, and corrugated or pleated tubes and cylinders.

The present claims are directed to a continuous roll composite material. As described in the present application, the claimed continuous roll composite material may be prepared from a substrate material comprising a carbon fiber reinforcement that is continuously fed through a process furnace and is exposed to a carbon-containing process

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gas. The carbon-containing process gas is heated to a temperature sufficient to decompose the carbon-containing species in the process gas, thereby depositing pyrocarbon on the substrate material. The substrate material may be provided as a continuous sheet or web, and the means for continuously advancing the substrate material through the process furnace may include a reel-to-reel system. The reel-to-reel system generally includes a feed reel and a take-up reel. The starting substrate material comprises a continuously wound roll positioned on the feed reel. The starting substrate material is unwound from the feed reel and continuously fed through the process furnace, and pyrocarbon is deposited on the substrate material to form a carbon-carbon composite material. This densified carbon-carbon composite material exits the process furnace and is continuously wound over itself on a take-up reel to form a multi-layer continuous roll carbon-carbon composite material. The continuous roll composite material claimed in the present application is capable of being unwound for use in further fabrication procedures.

Applicants submit that U.S. Patent No. 6,155,432 as modified by U.S. Patent No. 6,264,045 fails to teach or suggest a composite material that is wound over itself to form a continuous composite roll composite material product. In fact, the Office Action expressly concedes that U.S. Patent No. 6,155,432 "does not teach wrapping the material on itself" to form a continuous roll composite material. Nevertheless, it is alleged that U.S. Patent No. 6,264,054 discloses that filter materials comprising substrates of inorganic fibers and whiskers can be formed into any desired shape by wrapping or winding the substrate around mandrels.

The passages of U.S. Patent No. 6,264,045 relied upon in the Office Action to establish the *prima facie* case of obviousness are found at column 6, lines 22-65. Applicants, however, submit that disclosure from these passages actually distinguishes the claimed continuous roll composite material from the cited reference.

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Column 6, lines 32-34 discloses that “[T]he fibers may be wrapped in the dry state or they may be impregnated by a matrix precursor prior to wrapping, winding or stacking.” This passage clearly teaches that either the fiber reinforcement, or the fiber reinforcement impregnated with a matrix precursor (a pre-preg), is wrapped or wound on a mandrel. The presently claimed continuous roll composite material is not a plain fiber reinforcement or a pre-preg of fiber reinforcement and matrix precursor. To the contrary, the continuous roll composite material is a densified material comprising a fiber reinforcement and a pyrocarbon addition that was deposited by the decomposition of the carbon-containing process gas. Unlike the presently claimed continuous composite roll material, neither of the plain fiber reinforcement (no matrix precursor addition) or the fiber reinforcement impregnated with the precursor is a final densified composite material. To the contrary, the fiber reinforcement impregnated with a matrix precursor must then be heat treated to convert the organic phases from the matrix precursor into carbon, and then be densified by, for example, chemical vapor infiltration (“CVI”). There is no teaching or suggestion that a composite material densified with pyrocarbon is wrapped or wound in successive layers to form a multi-layer continuous roll composite material.

Column 6, lines 48-57 of the cited reference further teaches “[T]he carbon/carbon composites useful in the present invention may be fabricated by a variety of techniques. Conventionally, resin impregnated carbon fibers are autoclave- or press-molded into the desired shape on a tool or in a die. For example, lay-up of two dimensional (2D) continuous fiber or woven fabrics may be formed on a lay-up tool in the desired shape. The molded parts are heat-treated in an inert environment from about 700 to 2900°C in order to convert the organic phases to carbon.” Again, there is no disclosure, teaching or suggestion that the resin impregnated carbon fibers are wound over themselves to form a continuous, multi-layer composite on the lay-up tool. Furthermore, the resin impregnated carbon fibers are placed in or on a tool or in a die of a suitable shape, and then autoclave- or press-molded into the desired shaped. The step of either autoclave- or press-molding the lay-up results in a final, set product shape, and this shape is dictated by the pre-selected shape of the tool or die. These autoclave- or press-molded products do not constitute multi-

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layer roll products that can be unwound to form other carbon-carbon composite product forms.

Additionally, the description of stacking the fibers (Column 6, Line 34) also fails to disclose, suggest or provide motivation for a continuous roll carbon-carbon composite material that is continuously wound over itself, as a stacking operation is not a wrapping or rolling operation.

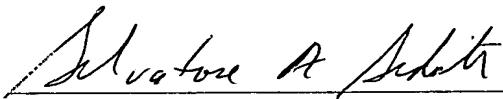
Thus, the disclosure found at Column 6, Lines 22-65 of U.S. Patent No. 6,264,045 fails to disclose, suggest or provide motivation for a continuous roll carbon-carbon composite material that is wound over itself to form a multi-layer roll product. The Office Action conceded that U.S. Patent No. 6,155,432 does not disclose a continuous roll product. Because neither U.S. Patent No. 6,155,432 nor U.S. Patent No. 6,264,045 teach or suggest a continuous roll composite material wound over itself, the combination of these two references also fails to teach or suggest all of the claimed product. A *prima facie* case of obviousness under §103 has not been properly established and therefore Applicants respectfully request that the rejection under 35 U.S.C. §103(a) be withdrawn.

Claims 43-52 all depend directly or indirectly on claim 42 and only serve to further limit independent claim 42. In view of the above remarks, Applicants respectfully request that the rejection under 35 U.S.C. §103(a) be withdrawn, and that the Examiner issue a formal notice of allowance directed to claims 42-52.

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Should the Examiner have any questions, Applicants' undersigned attorney would welcome a telephone call.

Respectfully submitted,



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